REMARKS

Claims 1-17 and 20-23 are now pending in the application. Claims 18 and 19 are cancelled. Claims 20-23 are added. Claims 1, 8, and 10 are amended. Support for the amendments and additions may be found in the originally filed specification at paragraphs 22-24. The Specification is also amended. Replacement drawing sheets are provided. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

DRAWINGS

The drawings stand objected to for certain informalities. Applicants have attached revised drawings for the Examiner's approval. In the "Replacement Sheets" reference numerals have been enlarged and emboldened, and positions have been adjusted to allow overall enlargement of the drawings while obtaining improved margins. An additional step has been added in Figure 2 at element 53, labeled "reduce variance." Support for the variance reduction step may be found in the originally filed specification at paragraphs [0017], [0021], and [0023]. Thus, no new matter is added.

SPECIFICATION

Applicants have amended the specification at paragraphs 17 and 25 to invoke element 53 of Figure 2 and to correct a typographical error. No new matter is added.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-4, 7-14, and 17-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Florencio et al. (U.S. Pat. No. 6,621,866) in view of Chen et al. ("Quantization Index Modulation: A Class of Provably Good Methods for Digital

Watermarking and Information Embedding") hereinafter referred to as Chen. This rejection is respectfully traversed.

Florencio et al. is generally directed toward a method for inserting a visual element into an MPEG bit stream. In particular, the Examiner relies on Florencio et al. to teach the partial decoding and partial encoding aspects of Applicant's claimed invention. Florencio et al., however, does not teach, suggest, or motivate embedding data in quantization indices of a partially decoded data stream using a spread spectrum technique.

Chen is generally directed toward quantization index modulation. In particular, the Examiner relies on Chen to teach selecting quantization indices of a data stream, determining an amount by which the indices can be modified, and embedding data into the quantization indices. However, the Examiner erroneously claims that Chen's work teaches a provably better way of watermarking information. In particular, Chen's work is not better in the absolute sense. For example, Chen's scheme is susceptible to scaling attack (i.e., the watermarked signal is multiplied by a constant by a malicious attacker). In contrast, the spread spectrum technique recited in the independent claims and Applicants' enhanced technique recited in the dependent claims have the merit of not being affected by a scaling attack at all. Thus, Applicants' embedding technique is significant.

Applicant's claimed invention is generally directed toward embedding data in compressed audio data streams. In particular, Applicant's claimed invention is directed toward embedding data in quantization indices of a partially decoded data stream using a spread spectrum technique. For example, independent claim 1, as amended, recites,

"embed the data into the quantization indices using a spread spectrum technique."
Independent claims 8 and 10, as amended, recite similar subject matter. Thus, neither
Florencio et al. nor Chen, alone or combined, teach, suggest, or motivate all of the
limitations recited in the independent claims. These differences are significant for the
reasons detailed above.

Accordingly, Applicants respectfully request the Examiner reconsider and
withdraw the rejection of independent claims 1, 8, and 10 under 35 U.S.C. § 103(a),
along with rejection on these grounds of all claims dependent therefrom.

Claims 5-6 and 15-16 stand rejected under 35 U.S.C. § 103(a) as being
unpatentable over Florencio et al. (U.S. Pat. No. 6,621,866) in view of Chen and further
in view of Sprague (U.S. Pat. No. 4,617,645). This rejection is respectfully traversed.

For discussion of Florencio et al. and Chen, Applicants respectfully direct the
Examiner's attention to remarks detailed above with respect to rejection of the
independent claims.

Sprague is generally directed toward a compaction method for waveform
storage. In particular, the Examiner relies on Sprague to teach compressing audio data
by sorting the data in descending order, and then constructing a new set of data by
taking the difference between pairs of consecutive samples resulting in an alternating
signed data. However, the Examiner wrongly states similarity Applicant's claimed
invention and the work of Sprague (p. 6, 19-22). In particular, the Examiner remarks
that Sprague's operations "involve" sorting and taking the difference between
consecutive signals. This description matches Applicants' claimed invention, but not
Sprague's. According to Sprague's original presentation (equation in line 16 of col. 3),

the description is significantly different from what is described by the Examiner. Notably, Applicants' claimed invention takes the difference between consecutive signal pairs, but do not perform manipulation across pairs. Therefore, one can think of Applicants' operation as only applying to the odd or even samples. But in Sprague's work, his operation, which is not pure sample difference anyway (see equation in line 16 of col. 3), applies to every sample. This difference could lead to subtlety in applying watermarking to Sprague's scheme as modification to the operated signal (after the so-called "sample difference") can lead to significant error propagation to the signal in the original domain (before "sample difference"). Therefore, the differences between the teachings of Sprague and Applicants' claimed invention are significant.

Applicant's claimed invention is generally directed toward embedding data in compressed audio data streams. In particular, Applicant's claimed invention is directed toward an enhanced spread spectrum technique that involves reducing the variance of the partially decoded data stream, preferably by sorting the partially decoded data stream in at least one of ascending and descending order, thereby obtaining a sorted sequence, constructing a new partially decoded data stream by taking the difference of every pair of two consecutive samples in the sorted sequence while alternating the sign of every other difference value, and substituting the new partially decoded audio data stream for the partially decoded audio data stream. For example, claims 5 and 6 together recite, "reduce the variance of the partially decoded data stream ... sort the partially decoded data stream in at least one of ascending and descending order, thereby obtaining a sorted sequence; construct a new partially decoded data stream by taking the difference of every pair of two consecutive samples in the sorted sequence

while alternating the sign of every other difference value; and substitute the new partially decoded audio data stream for the partially decoded audio data stream." Claims recite 15 and 16 similar subject matter. Thus, neither Florencio et al., Chen, nor Sprague, alone or combined, teach, suggest, or motivate all of the limitations recited in the claims 5, 6, 15, and 16. These differences are significant for the reasons detailed above.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of claims 5, 6, 15, and 16 under 35 U.S.C. § 103(a).

NEW CLAIMS 20-23

Neither Florencio et al., Chen, nor Sprague, alone or combined, teach, suggest, or motivate that side information is communicated from the partial decoder to the partial encoder, the side information including information relating to one or more of an original codebook used by the partial decoder, an original host signal received by the partial decoder, or a decoding process employed by the partial decoder. These differences are significant because the side information, such as the original codebooks, is needed by the partial decoder in order to achieve the embedded host data stream by reversing the partial decoding process. However, it is inefficient to search for the original codebooks again at the partial encoder.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is

believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: *October 28, 2005*   By: _____
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[GAS/JSB/kup]

AMENDMENTS TO THE DRAWINGS

The attached "Replacement Sheets" of drawings include changes to Figures 1-4. The attached "Replacement Sheets," which include Figures 1-4, replace the original sheets including Figure 1-4.

Attachment: Replacement Sheets